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CCITT SGXV
Working Party XV/1
Specialists Group on Coding for Visual Telephony

Document #409
December 1988

SOURCE: JAPAN

TITLE: BLOCK ADDRESSING METHOD FOR MACRO ATTRIBUTE

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1. Introduction

In document #357, a "block addressing method for macro attribute" was proposed to reduce the amount of information for EOB in RM5. In the document, a variable length code set was designed common to the "inter" and "MC coded" macro blocks. To more improve the performance, a new method was investigated in RM5, which has two code sets; one for "inter" and the other for "MC coded" blocks.

2. Criterion function

To compare the performance of the methods, the following criterion function was defined:

$$F = Nc * Lp + Nu * Le$$

where Nc: number of coded macro blocks per frame
Lp: average length of pattern codes
Nu: number of EOB codes for non-coded blocks per frame
Le: EOB code length

3. Simulation result

A result for the value of F obtained by a computer simulation with four data sequences, Claire, Miss America, Salesman, and Swing, is shown in Annex 1. The values of each component of the criterion function are shown in Annex 2. Le, EOB code length, was fixed to two bits.

4. Conclusion

Annex 1 shows only a slight improvement. Therefore the method proposed in document #357 would be sufficient.

As a consequence, we propose the following two items for the p*64 flexible hardware specification, which are in Annex 3:

- CBP (coded block pattern)
- a transmission order in a macro block

Annex. 1 :

	FLC		VLC (Inter + MC Coded)	①+②	VLC (Inter) ①	VLC (MC Coded) ②
RM5	922.3		—	—	—	—
Method 1	680.8		—	680.8	514.0	166.8
Method 2	739.6		649.3	649.1	482.7	166.4
Method 3	609.8		541.2	534.7	376.7	158.0
Method 4	600.2		532.8	528.3	373.5	154.8
Method 5	598.8		569.3	562.1	399.2	162.9
Method 6	709.2	①	567.4	550.8	370.0	180.8
		②	622.9	600.8	412.8	188.0

Note: For details of methods 1-6, see Annex 2 to Doc.#357.

Annex. 2 (1/2) :

Number of coded macro blocks (Nc)

	Coded MB	Intra MB	MC Coded MB	Coded Frames
Claire	16772	9051	7721	164
Miss America	6737	3274	3463	49
Salesman	19109	13911	5198	149
Swing	14803	13806	997	124
Total	57421	40042	17379	486
Total/Frame	118.2	82.4	35.8	

Average length of pattern codes (Lp)

	FLC		VLC(Inter + MC Coded)	VLC (Inter)	VLC (MC Coded)
Method 1	1.0		—	—	—
Method 2	2.0		1.24	1.20	1.34
Method 3	3.0		2.42	2.38	2.33
Method 4	3.0		2.43	2.38	2.42
Method 5	3.0		2.75	2.85	2.32
Method 6	6.0	①	4.08	4.49	5.05
		②	5.27	5.01	5.25

Annex 2 (2/2) :

Number of BOB codes for non-coded blocks (Nu)

	RM5		Method 1		Method 2		Method 3		Method 4		Method 5	
	Inter	MC Coded	Inter	MC Coded	Inter	MC Coded	Inter	MC Coded	Inter	MC Coded	Inter	MC Coded
Claire	37136	22014	22502	12430	21082	12074	10218	8358	9018	7066	7075	7720
Miss America	14189	12644	11543	9358	6603	6942	3667	4154	3595	3996	8536	6759
Salesman	60031	17686	33527	8168	32879	8092	14631	4622	14185	4478	7636	3469
Swing	57959	2573	37317	1885	32961	1649	15377	981	16317	1043	16722	1441
Total	169315	54917	104889	31841	93525	28757	43893	18115	43115	16583	39969	19389
Total/Frame	348.4	113.0	215.8	65.5	192.4	59.2	90.3	37.3	88.7	34.1	82.2	39.9

Annex 3: Modification to Doc#373

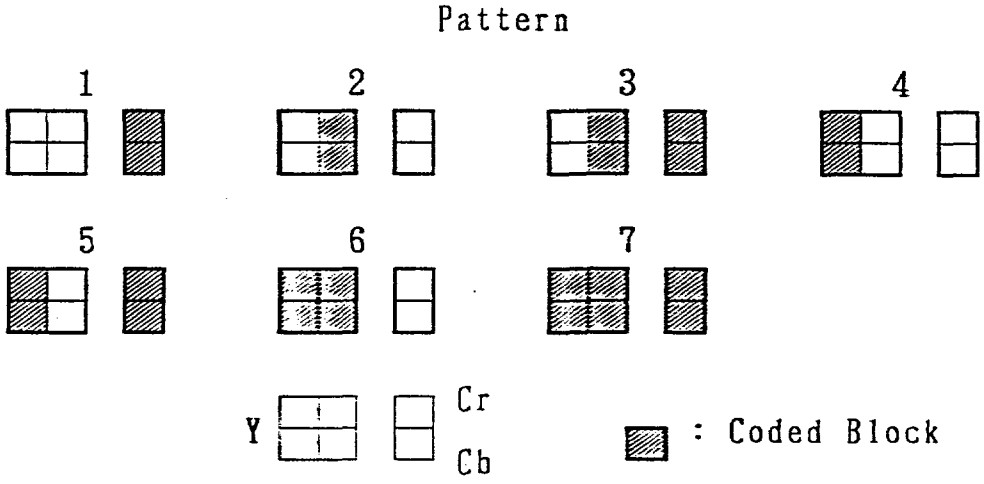
● CBP (coded block pattern)

(Modified) Figure 8 Structure of macroblock layer

Coded Block Pattern (CBP)

CBP is present only if so indicated by TYPE3.

A codeword of up to 5 bits signifying the pattern of coded/non-coded blocks within a macroblock as is depicted in figure x.

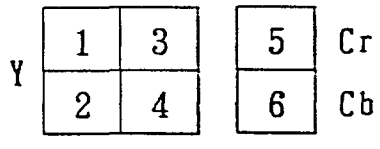


Pattern number	Code length	Code
6	2	00
2	2	10
4	2	11
7	3	011
1	4	0100
3	5	01010
5	5	01011

Figure x Coded block pattern and its codewords

● A transmission order in a macroblock

For the consistency between the macroblock pattern (see figure x) and transmission order of blocks within a macroblock, we propose a modified figure 9.



(Modified) Figure 9 Arrangement of blocks in a macroblock